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A Review of the Solidification Plant Process

at the Upper Ottawa Disposal Site

Region of Hamilton-Wentworth

Department of Engineering

August 15, 1979



A Review of the Solidification Plant Process

at the Upper Ottawa Disposal Site

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## A Review of the Solidification Plant Process

### at the Upper Ottawa Disposal Site

#### I Introduction

The Solidification Plant at the Upper Ottawa Site was established in April 1977 under an Agreement with the firm of K. D. Enterprises a subsidiary owned by Mr. M. D. Groote.

The main function of this solidification process was to mix inorganic liquid wastes with various other reagents to obtain a solid end product after curing which would be basically an inert material in silicate form which encapsulates the heavy metals and prevents them from leaking out and harming the environment.

This patented process was originated by Mr. D. Krofchak of Canadian Waste Technology in Rexdale, Ontario and experimentation was carried out in liaison with the Ministry of the Environment at the St. Lawrence Cement Company in Clarkson, Ontario. The tests carried out at this location were most impressive and the M.O.E. later supported an application by K. D. Enterprises, who were licensed to operate this process in Ontario, to the Region of Hamilton-Wentworth for the leasing of 2 acres of property at the Upper Ottawa Site for the installation and operation of an experimental small scale solidification process. The Regional Council approved this proposal in 1977 and an Agreement was executed.

The steel making industry which is important to our community generates large volumes of inorganic liquid wastes along with many smaller steel oriented satellite industries. An efficient disposal system is needed for these wastes to render them harmless to our environment. If legal disposal systems are not available then illicit disposal is encouraged and major problems result.

#### II SITE ENTRY CONTROLS

Regulations controlling the acceptance of liquid wastes at the Upper Ottawa Site are laid down in Regional By-Law R79-81. Two disposal areas are available on site for liquid waste disposal namely the Solidification Plant and the landfill area.

The Solidification Plant accepts inorganic liquid wastes only, such as waste pickle liquors from steel plants, chromic acid and plating liquors from plating shops, chromate and dichromate liquors from local steel plants, acids from galvanizing shops.



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Site Entry Controls    Cont'd ...

These wastes must be accompanied by the "Ministry of the Environment Way Bill" required by the Environmental Protection Act. The M.O.E. Way Bill provides information as to the source, the type of waste, the quantity, the hauler, the receiver, and the type of disposal system. This Way Bill is handed by the hauler to the operators of the Plant. In addition the Regional Analysis Form properly filled out is given to Regional Staff which provides information regarding the type of liquid waste. Another required form entitled "The Regional Declaration Form" is also handed to Regional Staff. This form provides data such as waste type, quantity, source, hauler which is information contained in the M.O.E. Way Bill. The Region in this case does not receive a copy of the Way Bill since the disposal-receiver is the operator of the Solidification Plant. In the case of landfill area disposal of liquid wastes, the Region is then the disposal-receiver and receives a copy of the Way Bill.

Only liquid wastes generated within the Region of Hamilton-Wentworth are permitted by Regional Staff into the Solidification Plant. However, certain solid and liquid reagents are required for the patented process and the quality of these reagents plays an important part in the process. Reagent types and sources are as follows:

1. liquid clay - from Rolland Paper - Toronto
2. solid clay - Canada Brick - Region of Halton
3. lime - Domtar - Woodstock, Ontario  
    - Stelco - Ingersoll, Ontario
4. Sulphuric acid - Hogarth Galvanizing Ltd. - Malton, Ontario  
    - Pure Metal Tinning - Malton, Ontario  
    - G.S.W. Limited - Fergus, Ontario

The Plant Operator submits monthly production reports to the Region indicating the gallons processed, the waste sources, waste types, the reagents imported, the sources of the reagents and inert material produced, as well as analytical and leachate test data. A typical report for the month of June is included in the Appendix as #1. A copy of this report is given to the Ministry of the Environment for their information and review of test results. The Ministry also carry out spot-checks of the final solidified product by sampling at the Ottawa Site with testing and analysis by the M.O.E. Laboratory in Toronto.

Preliminary analysis of the final product have also been carried out recently by our Regional Laboratory. It should be pointed out that there are many different methods of determining the quality of the leachate from this material. The M.O.E. presently employ two recommended methods. The Regional Laboratory has used one of these methods in its assessment study. The M.O.E. has favoured the alternative in its analyses. Both laboratories, in liaison, are now in the process of evaluating each testing system to establish which is preferable for control use. The process concept itself is not in dispute. Sampling of the final product will be carried out on a regular basis, with testing by the Regional Laboratory.





Site Entry Controls    Cont'd ...

The final solidified end product is disposed on the landfill site area as daily cover material. For the first 6 months of 1970; a total of 1,500,000 gallons have been processed through the plant.

In order to provide a complete picture of liquid waste controls, some mention should be made at this point concerning the entry controls for the liquid wastes proposed for disposal on the landfill site area other than the Solidification Plant. They are as follows:

1. Liquid waste haulers transporting organic liquid wastes to the Ottawa Site for disposal on the landfill area are required to provide a M.O.E. Way Bill to Regional Staff. A copy of this form is then forwarded by the Region to the Ministry of the Environment.
2. The "Regional Analysis Form", properly filled in, must also be submitted by site users to Regional Staff on entry to the site. This form provides for a declaration by the generator as to the composition of the liquid and that it is not an environmentally hazardous liquid as defined in the non-acceptable classifications noted on this form.
3. All liquid waste entering the Disposal Site are sampled by Regional Staff. The samples are taken to the Regional Laboratory for an analysis which along with the Regional Analysis Form, filled out by the source and submitted by the hauler.

A complete listing of all liquid wastes entering the Ottawa Site is prepared monthly and submitted to the Regional Co-ordinator for his review. As a point of information, a total of 343,000 gallons of liquid waste have been disposed on the landfill area for the first 6 months of 1979. See Appendix #2 for a summary listing for month of May.

As pointed out in previous reports, the Minister of the Environment has stated that no further untreated liquid wastes will be accepted into landfill sites after 79 12 31. Accordingly, as approved by Regional Council, notices have been distributed by Regional Staff to all interested generators and haulers presently using this site. A sample copy of this distribution is attached as Appendix #3.

III    VIABILITY OF SOLIDIFICATION CONCEPT

The original plant developed at the Upper Ottawa Site was defined as an "experimental plant". This was Stage II of a development commenced at the



### Viability of Solidification Concept    Cont'd ...

St. Lawrence Cement Company in 1976 where the patented process was proven as being fundamentally sound.

The experimental plant was intended as a proving ground to investigate further types of liquid wastes which would be disposed of in a safe manner without harm to public health and our community. A proper disposal system provides an important service to industry within our Region.

The Ministry of the Environment has been quite satisfied with the results of the tests and analyses which they have carried out during the life of the fixation process at the Ottawa Site, (see Appendix #4) and confidently support the establishment of additional solidification facilities in Ontario. The Ministry are currently inviting "Requests for Proposals" from various liquid waste disposal firms for the establishment of "limited term" or permanent silicate-based chemical fixation or solidification plants. Two such facilities are proposed, one in the Hamilton-Toronto area and possibly one in the Sarnia-Windsor area. The Ministry views the establishment of "limited-term, solidification plants which would handle a wide variety of wastes, convert these into "solid" material which could be stockpiled under controlled conditions until such time as permanent treatment and disposal facilities are available." The M.O.E. further estimates that these limited-term plants would be necessary for up to 5 years, which is the time required to develop permanent facilities consistent with the Ministry's plan. A short term plant could be proposed as part of a future permanent treatment complex. It is interesting to note that Regional boundaries would no longer provide "barriers" to the Transportation of liquid wastes to these proposed facilities. Wastes from all Regions would enter these plants. A copy of this "Request for Proposals" by the Ministry is attached as Appendix #5.

## IV

### PROCESS DEVELOPMENT ASSISTANCE

- a. Frontenac Chemical Waste Services have requested that an additional 1.3 acres of property be made available to them at the Upper Ottawa Site adjacent to the 2 acres already in use. The final end product presently is disposed on the landfill area in a slurry form and subsequently cures and solidifies as the free water evaporates from the material, and then forms daily cover for the refuse. This type of disposal prior to the hardening stage was approved by the Region and the M.O.E. since the 2 acre compound did not provide sufficient area for curing and storage. The provision of 1.3 additional acres would enable the final solidified product to be cured, stored, and analyzed and approved prior to disposal on the landfill area.





Process Development Assistance      Cont'd ...

Frontenac further requests the approval by the Region of certain temporary improvements to the Solidification Plant which the company is proposing in order to improve their operations particularly during inclement weather as follows:

1. a temporary building approximately 40' x 50' to house dry reagents.
2. replacement of mixing device to allow for heavier end product and housing of same in small temporary building
3. installation of a lime silo

Please refer to attached correspondence in Appendix #6.

- b. Frontenac also requires the continued support of the Region with respect to the importation of solid and liquid reagents from outside the Regional boundaries. The use of reagents such as clay, lime and sulphuric acid is an absolute necessity to the solidification process. Unfortunately these reagents are not available in either type or quantity in the Region of Hamilton-Wentworth. Therefore it is necessary to import most of them. Note in the appendix correspondence attached as #8 that some lime is obtained from Stelco in Hamilton.
- c. In Section III of this Report, reference has been made to an M.O.E. "Request for Proposals" for the establishment of Solidification Plants in Ontario. Frontenac Chemical Waste Services Limited has submitted a proposal for the consideration of the Ministry which can be briefly described as follows:

The company proposes to build two Treatment facilities. Plant #1 would be built in the Niagara-Hamilton area approximately 15 acres in size. It would include a new inorganic waste solidification unit as well as new pre-treatment synthetic fuel production, oil and solvent recovery and transfer station units. The products produced at this plant would be synthetic fuel, recovered oil and solvents and solid fill useful for top cover in sanitary landfills and other land reclamation projects. This plant would replace and phase out the current operations at the Ottawa Site, also Pier 24 in Hamilton and operations in Welland. It is estimated that it would require a 12 month period to acquire the necessary approvals and have completed for operation start-up.

At the new site, it will also be necessary to find disposal sites for the inert final end product. This material can be used as a supplement to the clay for final cover on the sites. The Ottawa Site requires 150,000 cubic yards of additional cover material and other Regional disposal sites will require approximately 200,000 cubic yards.





Process Development Assistance    Cont'd ...

Frontenac Chemical Waste Services Limited would be seeking the support of the Region in any future application by them to the Ministry of the Environment for Plant #1 if their proposal is accepted by the Province.

Plant #2 would be located at their Watford landfill site in the Sarnia-Windsor area and would be basically a waste stabilization plant. Wastes which cannot be properly solidified would be stabilized by mixing with flyash and cement dust. This stabilized sludge would be stockpiled at the Watford Site or shipped to an approved site in Detroit. This stabilization plant could be operational by 80-01-01. Total estimated cost for both facilities is \$5,300,000.

DEFENSIVE CONTROL SYSTEMS

In addition to the control measures outlined earlier in this report, further "back-up" systems are being investigated by the firm of Gartner-Lee Associates Limited recently hired by Regional Council. Their terms of reference provide for surface and ground water studies to establish if there is potential for migration of methane gas and leachate. If required, then adequate collection systems and structures will be designed for installation as part of the closure procedures required for the site under the M.O.E. regulation.

Currently, the Region has established 10 temporary methane gas sampling stations in the immediate vicinity of the Ottawa Site which will be monitored by the Regional Laboratory every 2 weeks. In addition there are 4 leachate sampling points in the landfill perimeter area where samples are taken every 2 weeks and sent to the Regional Laboratory for analysis. No gas has been detected to date and leachate results are acceptable.

Some of the investigatory boreholes which will be drilled by Gartner-Lee as part of their Study will be retained as future long-term monitoring stations. Sampling will be carried out on a regular schedule at these locations as a check on the efficiency of any future collection gas or leachate systems which may be required.

The Ministry of the Environment has carried on independent sampling and testing of Red Hill Creek in the vicinity of Mount Albion Falls in 1979 which has been an extension of the 1978 Study carried out jointly by the Region and the M.O.E. Since the bed-rock gradient slopes from Upper Ottawa Street towards Mount Albion Falls, then both surface and ground waters flow to that location. This location therefore is hydrogeologically an excellent monitoring station for the detection of any serious Creek contamination. M.O.E. staff have indicated that test results are at acceptable levels.



The City of Hamilton has zoned the Upper Ottawa Site area for park usage and proposes to develop the inherited site for that purpose when the disposal site has been closed to the satisfaction of the M.O.E.

VI

RECOMMENDATIONS

- a. That the Solidification Process be confirmed by the Region, in conjunction with the Ministry of the Environment, as being a viable disposal system for the treatment of inorganic industrial liquid wastes and that the Solidification Agreement with Frontenac Chemical Waste Services be continued on a month to month basis.
- b. That an additional 1.3 acres of land (adjacent to the existing plant) be provided by the Region at the Upper Ottawa Site to Frontenac Chemical Waste Services for the purpose of improving the curing and storing of end product material prior to disposal on the landfill site. Such disposal will be subject to quality control testing jointly approved by the M.O.E. and the Region and carried out by Regional Staff. It is also requested that the Regional Solicitor be directed to amend the existing agreement accordingly.
- c. That the Region approve of temporary improvements to the Solidification Plant at the Upper Ottawa Site, such as temporary housing structures, replacement of mixing Tank, and installation of a lime silo, all as shown on attached plan and correspondence in Appendix #6 and that the Regional Solicitor be directed to amend the existing Agreement accordingly.
- d. That the Region support the application of Frontenac Chemical Waste Services Limited to the Province of Ontario to establish a more suitable solidification plant location within the Region of Hamilton-Wentworth in order to proceed with the phasing out of the Solidification Plant at the Upper Ottawa Site.





APPENDIX

- #1      Production Report for month of June 1979 from Frontenac Chemical Waste Services Limited
- #2      Summary listing of all liquid wastes entering Ottawa Site for Month of May.
- #3      Notice to haulers and generators by Region of Hamilton-Wentworth
- #4      M.O.E. letter dated 79 08 15 supporting Solidification Process
- #5      "Request for Proposals" - M.O.E. dated 79 07 03
- #6      Temporary Improvements at Ottawa Site - Requested by Frontenac Waste Services Limited
- #7      Statement on Reagents - dated 79 08 15 from Frontenac Chemical Waste Services Limited.





# FRONTENAC

Chemical Waste Service, Ltd.

1960 BRAMPTON STREET, HAMILTON, ONTARIO, CANADA L8H 3S5 TELEPHONE (416) 545-4406

## PRODUCTION REPORT FOR THE MONTH OF JUNE 1979

FILE NO.	E 309-01		
LETTER NO.	K341-01		
DEPT. OF ENGINEERING			
JUL 23 1979			
ENV. SER.	ANALYST	RECEIVED BY	
ENG. SER.			
TRANS. SER.		ANS. BY	
REG. SURV.		FILED BY	
O.M.			

Total gallons solidified 247,500

Volume of inert material produced 1,383 cu. yds.

### Waste Sources:-

- Waste pickle liquor from local steel plants.
- Waste pickle liquor from local platers.
- Waste pickle liquor from galvanizers.
- Chromic acid and spent plating liquors from local plating shops.
- Chromate and dichromate liquors from local steel plants.

*copy sent to  
M.O.E. by FRONTENAC.*

### Sampling procedures:- (Lagoons)

One lagoon only was used as a source of wastes for solidification. The lagoon was filled and well mixed. Composite samples were then taken during the solidification runs. Each composite represents 100,000 gallons.

### Solidification and leach:-

An eight ounce jar was taken from each batch in the reaction tank. These were then used to make a composite sample for the filtrate and leach test analysis.

### Leach test parameters:-

Unsaturated flow

- Lump material 15-20 mm diameter
- to grams of material leached.
- analysis done on leachate after 24 hours, and leachate collected from 24-48 hours.

### Sample identification:-

The letter indicated type of sample.

eg: LW indicates original waste to be solidified  
F indicates the free or supernatant waster in the freshly solidified material.

cont'd..2



L indicates a leachate sample.

- The number refers to the run for the month. Letters following a number indicate leach sample after 48 hours. All analytical data expressed in PPM.

Analytical and leachate data:-

<u>Sample</u>	<u>SO4</u>	<u>Fe</u>	<u>Zn</u>	<u>Cr</u>	<u>pH</u>
LW1	57,730	16,200	8,820	1,292	1.70
2	51,520	19,200	9,640	2,229	1.95
3	57,500	11,400	5,840	643	1.95
FL	593	.43	.10	N.D.	11.55
2	589	.35	.38	N.D.	11.85
3	616	.28	.27	N.D.	11.40
L1	593	N.D.	.06	N.D.	10.25
2	570	N.D.	N.D.	N.D.	8.55
3	612	N.D.	N.D.	N.D.	8.10
L1A	391	N.D.	.03	N.D.	9.15
2A	418	N.D.	N.D.	N.D.	8.00
3A	327	N.D.	.05	N.D.	7.95

\*Detection limits Fe .05 PPM Zn .03 PPM Cr .07 PPM

Free water 19%

Leachate volumes corresponded to rainfalls of 122 to 136 cms. Assuming that the annual rainfall in the Hamilton area is 80 cm., the leach tests are the equivalent of between 18 and 20 months of rainfall.

Disposition of liquid wastes at Ottawa Street:-

Lagoon Storage	June 1	190,000 gals.
" "	June 30	250,000 gals.
Solidified during	June	247,500 gals.
Received during	June	249,618 gals.

Imported reagents (Solid):-

The use of clays and lime is an absolute necessity to the solidification process. Unfortunately, these reagents are not available in either type or quantity, in the Hamilton-Wentworth region. We therefore, imported the following:

<u>Type</u>	<u>Quantity</u>	<u>Source</u>
Clay	40,000 gals.	Rolland Paper
Clay	100 tons	Canada Brink



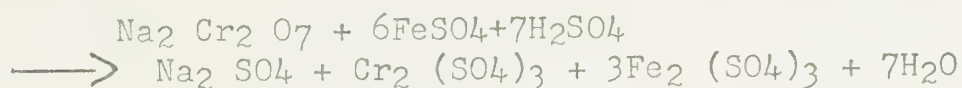


Imported Reagents (Solid):- cont'd.

<u>Type</u>	<u>Quantity</u>	<u>Source</u>
Lime	26 tons	Domtar
Lime	14.5 tons	Stelco (Ingersoll)
Lime	34 tons	Stelco (Hamilton)

Imported Reagents (Liquid):-

During the month of June, the liquors generated in the Hamilton-Wentworth region contained some 3,826 lbs. chromium in the hexavalent state. Hexavalent chromium in addition to being highly toxic is not directly treatable via the solidification process. The pre-treatment of hexavalent chromium consists of reacting it with ferrous iron and sulphuric acid. (See the following equation)



The equation indicates in 'Ball Park' figures that for every pound of hexavalent chromium more than 3 lbs. of ferrous iron and something less than 7 lbs. of sulfuric acid are required for its pretreatment.

During June, we treated some 11,000 gallons of zinc hydroxide slurry which contained some 15 tons of zinc hydroxide which required dissolution in sulphuric acid before entering the solidification process. (See the following reaction).



This reaction indicates each pound of zinc hydroxide requires 1 pound of sulphuric acid for its dissolution.

In order to prevent what could have been a serious shortage of ferrous iron and sulphuric acid, we imported 16 loads of galvanizers highly acidic waste pickle liquor. Sources and amounts are as follows:

<u>Source</u>	<u># of Loads</u>
Hogarth Galvanizing Ltd.	4
Pure Metal Tinning	11
G.S.W. Limited	1



Monthly Report For Ju 1979 For Pier 24, Depot #1 & Exported Material

Stelco	72,150	Acid	50,588	Caustic
Stelco Frost Wks.	3,200	Zinc	Ammonia	Chloride
Stelco #3 Galv.	974	Sodium	Di-Chromate	
M & T Chemical	2,200	Chrome		
Dofasco	14,106	Chromate & Etc.		
G.S.W.	2,300	Acid		
Slater Steel	2,300	Acid		
Rolland Paper	40,000	Clay	Reagent	
Hogarth	9,200	Acid		
Pure Metal	25,300	Acid		
Proctor & Gamble	11,000	Zinc	Hydroxide	
Stanton Pipe	16,000	Sand, Slit & Ash	Water	
Domtar	26	Ton	Lime	
Stelco (Ingersol)	29,000	lbs.	Lime	
Stelco (Hamilton)	68,000	lbs.	Lime	
Canada Brick (Pell Trucking)	10	Loads	of Clay	

Pier #24 In

Douglas Aircraft	1,750	Acid
Court Industries	2,300	Acid
Uniroyal	6,000	Acetone
Uniroyal (LpH)	41,100	Vitavax
Plastic Surface	13,500	Acid
C.P.W. (Gen. Elct.)	2,000	Acid
Ford	18,800	E-Coat
Ford	23,500	Solvent, Oil & E-Coat
Greening Donald	32,200	Water & Acid
Dofasco	2,300	Chromate
Noranda Metals	3,000	Acid
Stelco Burlington	18,400	Water & Acid

Pier #24 Out

St. Law. Cement	25,400
Solv.	
Alfa Cement	9,700
Solv.	
Newco	232,000
Acids	
Anachemia	2,400
Solv.	
<u>Oily Water</u>	
H.H.C.	41,400
Nat. Slag	4,600
Pier #24	29,900
Depot #1	9,200

Exported Our Truck

Fords	9,400	E-Coat To Frontier	June 1/79
Uniroyal	18,000	Vitavax to Frontier	1 Load refused at Frontier
DeHavilland	68	Drums Acids to Frontier	Returned to Pier #24
Westinghouse	37	Drums to Newco	June 8/79 Refused at Frontier
			Returned to Pier #24

Pier #24

Pumped out 493 drums in the yard.  
Pumped 16 loads of the tanks to be filtered for fuel.  
On June 29/79 emptied lagoon #4 at Pier #24 for Inspection.



## THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

## ENVIRONMENTAL SERVICES SECTION

## SUMMARY OF LIQUID WASTE DISPOSAL AT THE UPPER OTTAWA STREET LANDFILL SITE

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	CARRIER	SOURCE	DESCRIPTION FROM LAB. ANALYSIS	QUANTITY (Gallons)
2	C08115	MG Disposal	Inglis Company	Enamelling Frit Slurry	1 000
3	C08116	Industrial Disposal	Inglis Company	Enamelling Frit Slurry	1 350
4	C08117	MG Disposal	Inglis Company	Largely Inorganic Sludge	1 000
5	C07932	Stanton Pipes Ltd.	Stanton Pipes Ltd.	No sample required	1 600
	C07930	Stanton Pipes Ltd.	Stanton Pipes Ltd.	No sample required	1 600
	C07931	Stanton Pipes Ltd.	Stanton Pipes Ltd.	No sample required	1 600
7	C08410	Flash Pumping	Regional Hamilton	Sewage Scum	1 800
	C07388	Best Pumping	Canadian Tire	Oil, water, organic, & Inorganic sludge	2 500
8	C08118	MG Disposal	Inglis Company	Largely Inorganic Sludge	1 000
9	C08411	Flash Pumping	Regional Hamilton	Sewage Scum	2 000
10	C08120	MG Disposal	Inglis Company	Principally Inorganic Sludge and Water	1 000
11	C07415	Red-D-Mix	Proctor & Gamble	No Test Performed By Laboratory	1 000
12	C07935	Stanton Pipe	Stanton Pipe	Inorganic Sludge	1 600
	C07933	Stanton Pipe	Stanton Pipe	No Sample Required	1 600
	C07934	Stanton Pipe	Stanton Pipe	Inorganic Sludge	1 600
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THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE DISPOSAL AT THE UPPER OTTAWA STREET LANDFILL SITE

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	CARRIER	SOURCE	DESCRIPTION FROM LAB. ANALYSIS	QUANTITY (Gallons)
15	C08121	MG Disposal	Inglis Company	Truck Dumped Before Sample Obtained	1 000
16	C07123	Red-D-Mix	Procter & Gamble	Spent Filter Earth, Vegetable Oil & Water	1 000
	C07756	Jet Disposal	Hot Point Mfg.	Water & Vitreous Enamel Sludge	1 935
17	C07390	Best Pumping	Canadian Freightway Eastern Limited	Organic & Inorganic sludge, water, oil	2 500
18	C07124	Red-D-Mix	Procter & Gamble	Spent Filter Earth, vegetable oil & water	1 000
	C19780	Sewertech II	Jordan & Giesel Envest	Organic & Inorganic sludge & Water	1 500
	C08413	Flash Pumping	National Steel Car Corp.	Lime Slurry	2 000
	C08412	Flash Pumping	S.T.P. Hamilton	Sewage Scum	2 000
	C08122	MG Disposal	Inglis Company	No Test Performed by laboratory	1 000
19	C07938	Stanton Pipes	Stanton Pipes	No Sample Required	1 600
	C07937	Stanton Pipes	Stanton Pipes	No Sample Required	1 600
	C07936	Stanton Pipes	Stanton Pipes	No Sample Required	1 600
22	C07391	Best Pumping	St. Lawrence School	Principally inorganic sludge & Water	2 500
25	C08414	Flash Pumping	Region of Hamilton	Sewage Scum	2 000
26	C07939	Stanton Pipes	Stanton Pipes	No sample required	1 600
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## ENVIRONMENTAL SERVICES SECTION

# SUMMARY OF LIQUID WASTE DISPOSAL AT THE UPPER OTTAWA STREET LANDFILL SITE

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	CARRIER	SOURCE	DESCRIPTION FROM LAB. ANALYSIS	QUANTITY (Gallons)
26	C07940	Stanton Pipes	Stanton Pipes	No sample required	1 600
	C07941	Stanton Pipes	Stanton Pipes	No Sample Required	1 600
28	C07730	Jet Disposal	Camco Limited	* Mixed volatile low flash point solvent	990
	C08123	Industrial Disposal	Inglis Company	Vitreous Enamel Slurry	2 400
29	C08124	Industrial Disposal	Inglis Company	* Organic paintvenicle @ low flash solvent	1 600
30	C21207	Red-D-Mix	Procter & Gamble	Spent filter earth, vegetable oil and water	1 000
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THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
1	C07111	Red-D-Mix	Procter & Gamble		Zinc Sulphate	1000
	C18125	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Weak Pickle Liquor	2300
	C18124	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Weak Pickle Liquor	2300
	C18123	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Weak Pickle Liquor	2300
	C18121	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Spent Pickling Solution	2300
	C18122	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
	C17654	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
	C18120	Frontenac Chemical Waste	Pure Metals, Rexdale	X	Galvanized Spent Pickle Liquor	2300
	C18139	Frontenac Chemical Waste	Pure Metals, Rexdale	X	Galvanized Spent Pickle Liquor	2300
	C18140	Frontenac Chemical Waste	Cold Mill Waste Dofasco Water Treat Plant	X	Dilute Dichromate Cleaning Solution	2300
2	C17656	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C17655	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C17657	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
	C17658	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Spent Caustic Cleaning Solution	2300
3	C17601	Frontenac Chemical Waste	Frontenac Chemical Waste, Hamilton	X	10% Kaolin used for experimental purposes	2300
THIS PAGE TOTAL						33200
THIS MONTH TOTAL						



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

PAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
3	C17659	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
	C17660	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
	C17662	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Spent Pickle Liquor	2300
	C17661	Frontenac Chemical Waste	Slater Steel, Hamilton		Waste Pickle Liquor	2300
4	C07112	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C17667	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18142	Frontenac Chemical Waste	Dofasco Cold Mill, Hamilton	X	Sodium Dichromate Solution	2300
	C17666	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18141	Frontenac Chemical Waste	Dofasco Cold Mill, Hamilton	X	Sodium Dichromate Solution	2300
	C17665	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C17668	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C17664	Frontenac Chemical Waste	Dofasco Cold Water Waste Treatment Plant, Hamilton		Sodium Dichromate Solution	2300
	C07113	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C07114	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
7	C18148	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	1900
THIS PAGE TOTAL						29800
THIS MONTH TOTAL						



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH  
ENVIRONMENTAL SERVICES SECTION  
SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
7	C18143	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18147	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18146	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18145	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C18144	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
8	C17603	Frontenac Chemical Waste	Dofasco Cold Mill W.W.T.P.		Potassium Dichromate Solution	2300
	C18150	Frontenac Chemical Waste	Dofasco Cold Mill W.W.T.P.		Potassium Dichromate Solution	2300
	C18149	Frontenac Chemical Waste	Stelco Hilton Works, ETL Hamilton Ion Exchange		Waste Pickle Liquor	2300
	C17604	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton Ion Exchange		Waste Pickle Liquor	2300
	C17605	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton		Waste Pickle Liquor	2300
9	C38495	O.C.L.W.	C.P.M., Barrie	X	Clay Slurry (kaolin)	2500
	C17606	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17608	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Spent Caustic Cleaner	2300
	C17607	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17609	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	1200
THIS PAGE TOTAL						33600
THIS MONTH TOTAL						





THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
10	C17674	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton Ion Exchange		Spent Cleaning Solution	2300
	C17610	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton Ion Exchange		Waste Pickle Liquor	2300
	C17611	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
11	C17615	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton Ion Exchange		Spent Cleaning Solution	2300
	C17614	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17613	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C07116	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
12	C18175	Frontenac Chemical Waste	G.S.W.	X	Waste Pickle Liquor	2300
14	C17777	Frontenac Chemical Waste	Stelco Hilton Works, Hamilton #16#2 Galv.		Sodium Chromate Solution	1608
	C17778	Frontenac Chemical Waste	Dofasco, Hamilton		Spent Cleaning Solution	2300
	C07117	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C07118	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C07119	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
15	C17779	Frontenac Chemical Waste	Pure Metal & Tinning	X	Waste Pickle Liquor	2300
	C17675	Frontenac Chemical Waste	Pure Metal & Tinning	X	Waste Pickle Liquor	2300
THIS PAGE TOTAL						28608
THIS MONTH TOTAL						



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH  
ENVIRONMENTAL SERVICES SECTION  
SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
15	C17780	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17627	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Spent Caustic Cleaning Solution	2300
	C17628	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Spent Caustic Cleaning Solution	2300
	C17781	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17782	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Waste Pickle Liquor	2300
	C17629	Frontenac Chemical Waste	Stelco Hilton Works ETL, Hamilton		Dilute Zinc Sulfate	1000
	C07122	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C07120	Fed-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C07121	Fed-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1000
	C38949	O Connor Liquid Waste	Rolland Paper, Scarborough	X	Kaoline Slurry 10 W/O	4000
16	C17632	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F. Hamilton		Spent Sulfuric Acid, Pickle Liquor	2300
	C17631	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L. Hamilton		Spent Caustic Cleaning Solution	2300
	C17630	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L. Hamilton		Waste Pickle Liquor	2300
	C17633	Frontenac Chemical Waste	Stelco Hilton Works, Ion Exchange		Waste Pickle Liquor	2300
	C17783	Frontenac Chemical Waste	Stelco Hilton Works, Ion Exchange		Spent Caustic Cleaning Solution	2300
THIS PAGE TOTAL						32300
THIS MONTH TOTAL						





THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH  
ENVIRONMENTAL SERVICES SECTION  
SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
16	C17634	Frontenac Chemical Waste	Stelco Hilton Works, Ion Exchange		Waste Pickle Liquor	2300
17	C17635	Frontenac Chemical Waste	Pure Metal & Tinning	X	Galvanizing Pickle Liquor	2300
	C17616	Frontenac Chemical Waste	Pure Metal & Tinning	X	Galvanizing Pickle Liquor	2300
	C17636	Frontenac Chemical Waste	Hogarth Galvanizing, Malton	X	Galvanizing Pickle Liquor	2300
	C17784	Frontenac Chemical Waste	Hogarth Galvanizing, Mississauga	X	Galvanizing Pickle Liquor	2300
	C17637	Frontenac Chemical Waste	Hogarth Galvanizing, Halton	X	Galvanizing Pickle Liquor	2300
	C17617	Frontenac Chemical Waste	Hogarth Galvanizing, Malton	X	Galvanizing Pickle Liquor	2300
18	C17638	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L. Hamilton		Waste Pickle Liquor	2300
	C17785	Frontenac Chemical Waste	Stelco, Hamilton		Waste Pickle Liquor	2300
	C17786	Frontenac Chemical Waste	Stelco Hilton Works, Steel Serv.		Waste Pickle Liquor	1200
	C17639	Frontenac Chemical Waste	Stelco Canada Works, Hamilton		Waste Pickle Liquor	2300
	C17640	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F. Hamilton		Waste Pickle Liquor	2300
	C17787	Frontenac Chemical Waste	Slater Steel, Hamilton		Spent Caustic Cleaner	1500
	C17641	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F. Hamilton		Waste Pickle Liquor	2300
22	C17788	Frontenac Chemical Waste	Dofasco, C.M.W.W.T.P.		Sodium Dichromate Solution	2300
THIS PAGE TOTAL						32600
THIS MONTH TOTAL						



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH  
ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.E. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
22	C17789	Frontenac Chemical Waste	Dofasco C.M.W.T.P.		Sodium Dichromate Solution	1088
	C17643	Frontenac Chemical Waste	Stelco Hilton Works, ETL		Waste Pickle Liquor	2300
	C39175	O.C.L.W.	Rolland Paper, Ont. Scarborough	X	Clay & Water Slurry	4000
	C17644	Frontenac Chemical Waste	Stelco Hilton Works, ETL		Spent Cleaning Solution	2300
	C17790	Frontenac Chemical Waste	Slater Steel		Waste Pickle Liquor	2300
	C17645	Frontenac Chemical Waste	Stelco Hilton Works, ETL		Spent Caustic Cleaner	2300
23	C17649	Frontenac Chemical Waste	Stelco Hilton Works, ETL		Waste Pickle Liquor	2300
	C17648	Frontenac Chemical Waste	Dofasco #1 Galvanize Line		Sodium Dichromate Solution	2300
	C17647	Frontenac Chemical Waste	Dofasco #1 Galvanize Line		Sodium Dichromate Solution	2300
	C17646	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F.		Waste Pickle Liquor	2300
	C17792	Frontenac Chemical Waste	Stelco, ETL		Spent Cleaning Solution	2300
	C17650	Frontenac Chemical Waste	Stelco Hilton Works, Ion Exchange		Waste Pickle Liquor	2300
24	C38907	O.C.L.W.	Rolland Paper	X	10 W/O Clay Slurry	4000
24	C20829	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F.		Waste Pickle Liquor	2300
	C17796	Frontenac Chemical Waste	Stelco Hilton Works, ETL		Waste Pickle Liquor	2300
THIS PAGE TOTAL						3488
THIS MONTH TOTAL						



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

ENVIRONMENTAL SERVICES SECTION

SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

DAY	M.O.F. WAY BILL NO.	HAULER	SOURCE	REAGENT	DESCRIPTION	QUANTITY (GAL.)
25	C07125	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1 000
	C17797	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L.		Waste Pickle Liquor	2 300
	C20830	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L.		Waste Pickle Liquor	2 300
	C2831	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L.		Waste Pickle Liquor	2 300
	C21203	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1 000
28	C20833	Frontenac Chemical Waste	Stelco Hilton Works, ION exchange		Waste Pickle Liquor	2 300
	C20835	Frontenac Chemical Waste	Stelco Hilton Works, E.T.L.		Waste Pickle Liquor	2 300
	C20823	Frontenac Chemical Waste	Stelco Hilton Works, N.S.F.		Waste Pickle Liquor	2 300
	C20834	Frontenac Chemical Waste	Stelco Hilton Works, ION exchange		Waste Pickle Liquor	2 300
	C21201	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1 000
	C21202	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1 000
29	C21204	Red-D-Mix	Procter & Gamble		Dilute Zinc Sulfate	1 000
	C20837	Frontenac Chemical Waste	Dofasco #2 Galvanizing Line		Waste Galvanizing Liquor	2 300
	C20836	Frontenac Chemical Waste	Dofasco, Cold Mill Waste Water Treatment		Spent Dichromate Cleaner	2 300
	C17800	Frontenac Chemical Waste	Stelco Canada Works		Waste Pickle Liquor	2 300
THIS PAGE TOTAL						28 000
THIS MONTH TOTAL						





## ENVIRONMENTAL SERVICES SECTION

# SUMMARY OF LIQUID WASTE RECEIVED AT THE K & D SOLIDIFICATION PLANT

MONTH OF May, 1979

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## THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

DEPARTMENT OF ENGINEERING  
71 MAIN STREET WEST, HAMILTON, ONTARIO 526-4170  
L8N 3T4

W. A. WHETEN  
B.Sc. F.E.I.C. P.Eng.  
COMMISSIONER OF ENGINEERING

REFER TO FILE NO. E309-07  
ATTENTION OF J.H. Bishop  
YOUR FILE NO.

79 07 25

Memo to: All Generators and Haulers of Liquid Industrial Wastes

Re: Disposal of Liquid Wastes on the  
Upper Ottawa Landfill Site

The Minister of the Environment, the Honourable Harry C. Parrott has indicated in a report to the Ontario Legislature on 78 11 21 that effective 80 01 01, the disposal of untreated liquid industrial wastes will be completely banned in landfill sites other than secure chemical sites specifically engineered for that purpose.

The Council of the Region of Hamilton-Wentworth has supported this policy and at it's meeting on 79 07 17 directed that all interested generators and haulers of liquid wastes in the Region be so advised. The deadline of 80 01 01 had been previously pointed out as early as February of this year when the Regional Analysis Form was introduced, and distributed.

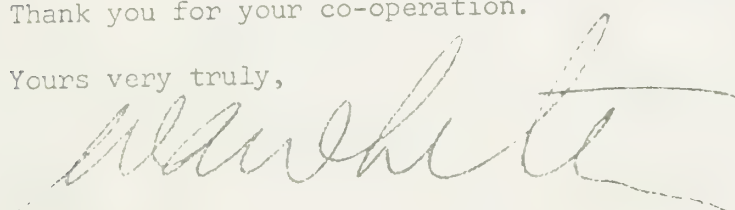
Advance warning is being provided at this early date in order to provide as much time as possible for planning by the present depositors for alternative disposal systems or locations for their liquid wastes.

Inorganic liquid wastes, however, which are acceptable for processing by the Solidification Plant, operated by Frontenac Chemical Waste Services Limited, will still be accepted at the Upper Ottawa Site on a month to month basis only.

The Region is prepared to offer advice and technical information in an assisting role where possible. We attach herewith a copy of a Ministry of the Environment publication entitled "Guidelines For The Treatment and Disposal of Hauled Liquid Industrial Wastes in Ontario."

Thank you for your co-operation.

Yours very truly,



Commissioner

JHB:km



GUIDELINES  
FOR THE  
TREATMENT AND DISPOSAL OF  
HAULED LIQUID INDUSTRIAL WASTES  
IN  
ONTARIO

DECEMBER, 1978



Ontario

Ministry  
of the  
Environment





## STATEMENT OF INTENT

These guidelines indicate, for various categories of hauled liquid industrial wastes, alternative methods of treatment and disposal which the Ministry believes are appropriate to ensure the continuing protection of the environment in Ontario. They represent a compilation of known information and practices to date but reflect the intention of the Ministry to prohibit the direct landfilling of untreated hauled liquid industrial wastes in the future.

Other treatment and disposal processes not incorporated into these guidelines may be used subject to approval by the Ministry of the Environment.

These guidelines are intended to serve as a basis for regulations which the Ministry intends to promulgate under The Environmental Protection Act. Comments on any aspect of these guidelines from waste generators, waste haulers, disposal site operators, trade associations, municipalities and any other interested persons will be welcomed.

Comments should be forwarded no later than  
March 31, 1979 to:

The Director  
Waste Management Branch  
Ontario Ministry of the Environment  
4375 Chesswood Drive  
Downsview, Ontario  
M3J 2C2



1. APPROVALS

Only those waste treatment and disposal processes or sites which have received a Certificate of Approval from the Ministry of the Environment may be used for the treatment and disposal of hauled liquid industrial wastes. Approved waste treatment and disposal processes should not be used to treat wastes other than those specified in the approval without obtaining further approval from the Ministry.

2. ON-SITE DISPOSAL

On-site disposal of hauled liquid industrial wastes is not acceptable except where specific approval for the wastes to be disposed and for the disposal method(s) to be employed has been obtained from the Ministry.

3. LANDFILLING

Untreated hauled liquid industrial wastes should not be deposited into municipally-owned or privately-owned sanitary landfills except where provided for in these guidelines.



#### 4. EXEMPTIONS

Wastes covered by other regulations and guidelines are exempted from these guidelines. Such wastes include:

- septic tank wastes;
- septage from holding tanks;
- sludges from domestic sewage treatment plants;
- agricultural wastes (eg., manure);
- PCB wastes;
- Pesticides;
- wastes from mining and milling operations.

Additional exemptions:

- waste slags from metallurgical operations.

#### 5. ALLOWABLE TREATMENT AND DISPOSAL

Table 1 indicates the recommended treatment and disposal processes for various categories of hauled liquid industrial wastes.

Although alternative treatment and disposal processes are listed for many of the waste categories, specific wastes may not be amenable to treatment and/or disposal by each of the alternatives listed. For this reason, these guidelines should be used with care.





TABLE 1

WASTE DESCRIPTION	WASTE CLASSIFICATION	TREATMENT AND/OR DISPOSAL
<u>A. ORGANIC WASTES</u>		
1. "Rich" Organic liquids	202-209 302-304	- recovery and re-use - reclamation - incineration
2. "Lean" Organic liquids	201-209 302-304	- recovery and re-use - reclamation - incineration - physical/chemical - biological - deep well disposal - wet air oxidation (WETOX) - solidification
3. Organic sludges and solids	202-209 301-304	- wet air oxidation (WETOX) - incineration - secure landfill - sludge farming - biological treatment - land disposal
4. Organic sludges - Plant & animal based	401	- As in A(3) - land disposal - sanitary landfill (Approval of MOE or owner required)
<u>B. INORGANIC WASTES</u>		
1. Inorganic liquids	101-106	- recovery and re-use - physical/chemical - deep well disposal - solidification



WASTE DESCRIPTION	WASTE CLASSIFICATION	TREATMENT AND/OR DISPOSAL
2. Inorganic sludges and solids	101-106	- solidification - secure landfill
3. Inert inorganic sludges and solids	402	- sanitary landfill (Approval of MOE or owner required) - land disposal
C. <u>OIL/WATER MIXTURES</u>		
1. Oil and water	201	- emulsion breaking - oil separation - electro chemical
a) oil phase		- As for waste oil, D below
b) water phase		- As in A(2) - municipal sewer system
c) sludge phase		- incineration - solidification - sanitary landfill (Approval of MOE or owner required) - land disposal
2. Oil interceptor and grit chamber clean out	201	- secure landfill - sanitary landfill (Approval of MOE or owner required) - land disposal
D. <u>WASTE OILS</u>	202	- recovery and re-use - reclamation - incineration - road oiling - fuel for cement kiln



WASTE DESCRIPTION	WASTE CLASSIFICATION	TREATMENT AND/OR DISPOSAL
<hr/>		
E. <u>SPECIAL WASTES</u>		
1. Caustic phenolates and sulphides from petrochemical processing	290	- reclamation - incineration - deep well disposal - chemical oxidation
2. Chromium hexavalent	103	- chemical reduction to trivalent state then as in B(1) or B(2)
3. Cyanides	104	
a) solutions 100 ppm $CN^-$		- alkaline chlorination - electrochemical oxidation then as in B(1) or discharge to municipal sewer - incineration
b) solids		- incineration - secure landfill
4. Halogenated organics	204 205 209 302 304 290	- incineration
5. Industrial brines	190	- deep well disposal - as recommended by MOE
6. Mercury and its salts	190	- solidification - secure landfill
7. Semi-metals and compounds	190	- secure landfill - solidification
- arsenic		
- antimony		
- boron		
- selenium		





WASTE DESCRIPTION	WASTE CLASSIFICATION	TREATMENT AND/OR DISPOSAL
8. Radioactive wastes		- to be reviewed with MOE and may be subject to Atomic Energy Control Board regulations
9. Tank truck washing wastes	(all)	- as recommended by MOE
10. Other wastes		- as recommended by MOE



DEFINITIONS1. GENERAL

- a) "Hauled Liquid Industrial Wastes" means those wastes generated by manufacturing or processing operations which are hauled away from the place where they are generated to another location, either off-site or on-site, for treatment and/or disposal. For the purposes of these guidelines, "hauled liquid industrial wastes" include industrial waste sludges, semi-solids and solid wastes.
- b) "Off-site" means at a site other than the property owned by the company where the manufacturing or processing operations which generate the wastes are located.
- c) "On-site" means within the property boundaries associated with the manufacturing or processing operations which generate the wastes.
- d) "Liquid" means that the waste is in the liquid or fluid state under normal conditions, can be pumped and must be contained in a suitable vessel.
- e) "Sludge" means a mixture of liquids and solids which will flow under normal conditions and can be pumped using standard pumping equipment or vacuum equipment.



- f) "Solid" means solid or a mixture of solids and liquids which will not flow under normal conditions and which cannot be pumped using standard pumping equipment.

2. WASTES

- a) "Rich Organic" means organic wastes having a total organic carbon content of greater than 5 percent ( $\text{TOC} > 5$  percent). Such wastes would normally contain sufficient BTU value to sustain combustion.
- b) "Lean Organic" means organic wastes having a total organic carbon content of less than 5 percent ( $\text{TOC} < 5$  percent). Such wastes would not normally sustain combustion and would require supplementary heat for complete combustion.
- c) "Halogenated Organics" means organic compounds containing chlorine, bromine, iodine or fluorine but primarily relates to chlorinated organic compounds.
- d) "Organic Sludges - Plant and Animal" means organic sludges resulting from manufacturing or processing operations involving animals or parts of animals, plants, vegetables or fruits. These wastes will generally be associated with the food and beverage industries, animal and fish processing plants and tannery operations.



e) "Inorganic" means solutions or aqueous mixtures composed primarily of inorganic compounds but which may contain traces of organic contamination.

f) "Inert Inorganic" means inorganic wastes which are not expected to change significantly under the conditions to which they will be exposed in the landfill. Approval is required from the Ministry to dispose of in a landfill other than a secure landfill any such wastes that contain in excess of 100 ppm (on an "as received" basis) of individual metals or semi-metals that are known to present special dangers to health or to the environment. These include:

antimony	lead
arsenic	mercury
boron	nickel
cadmium	selenium
cobalt	tin
copper	vanadium
	zinc

g) "Industrial Brines" means aqueous solutions of inorganic compounds having dissolved solids contents of greater than 1 percent (10,000 ppm).

### 3. TREATMENT AND DISPOSAL

a) "Sanitary Landfill" means a landfill constructed for the primary purpose of burying domestic and commercial refuse and garbage.





- b) "Secure Landfill" or "Secure Chemical Waste Landfill" means a landfill constructed for the disposal of chemical wastes in accordance with the regulations and guidelines of the Ministry of the Environment.
- c) "Biological" treatment means any of the biological treatment systems currently in use for the biochemical oxidation of organic materials.
- d) "Deep Well Disposal" means pressure injection of wastes into approved geological formations.
- e) "Land Disposal" means direct application onto land using methods approved by the Ministry of the Environment.
- f) "Incineration" means incineration in an approved waste incinerator.
- g) "Physical/Chemical" means any one or combination of a number of unit operations commonly employed in the treatment of wastes and include:

- |                          |                               |
|--------------------------|-------------------------------|
| - emulsion breaking      | - neutralization              |
| - chemical precipitation | - solids removal & thickening |
| - chemical oxidation     | - carbon absorption           |
| - ion exchange           | - reverse osmosis             |
| - ultra filtration       | - electro chemical processes  |



- h) "Recovery and Re-use" means where wastes are segregated and directed for re-use either on-site or off-site, and may include minor pre-treatment such as separation of organic and inorganic phases or separation of solids and liquids.
- i) "Reclamation" means the recovery of a usable product from a waste following extensive pre-treatment such as distillation, chemical treatment, re-refining, etc.
- j) "Solidification" or "Chemical Fixation" means any one of a number of processes by which liquid wastes are converted into stable solid products or encapsulated in a manner which prevents their release to the environment.
- k) "Sludge Farming" means a process whereby waste sludges are spread onto land, disced into the soil, nutrients are added and the deposited sludges are turned at frequent intervals to ensure continuing bacterial decomposition of the wastes.





Ontario

APPENDIX #4

Ministry of the Environment  
West Central Region

August 15, 1979

The Regional Municipality of  
Hamilton-Wentworth  
100 Main Street East  
HAMILTON, Ontario  
L8N 3V9

Attention: Mr. J. R. G. Leach  
Director of Engineering Services

Re: Fixation of Inorganic Industrial Liquid Wastes

Dear Sir:

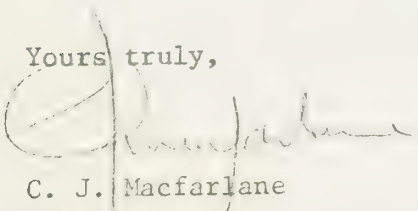
I would like to reply to your question regarding the Ministry's view of the acceptability of the fixation process for the treatment of inorganic industrial liquid wastes as operated in the Hamilton area.

Our Ministry has studied this matter in considerable depth and it has concluded that silicate based chemical fixation of these wastes is one of our preferred paths of action for the foreseeable future. It appears also that these processes are becoming accepted in European countries and the U.S.A.

To demonstrate our belief in this method, we are sending you a copy of the request for proposal for fixation which the Ministry has sent to a number of companies. The intention is that these companies will provide a fixation service to Ontario industries. The end result that we expect is that the wastes will be rendered into a stable product which will not cause environmental hazard to people or property.

You also asked whether the fixation material was suitable to be applied into the final cover of the Upper Ottawa landfill site. We think that this can be done successfully in conjunction with clay and soil to produce a cover suitable for vegetation. The details of this, I feel sure, can be worked out between us.

Yours truly,

  
C. J. Macfarlane  
Director

CJM:js

Centennial Plaza  
140 Centennial Parkway North  
Stoney Creek, Ontario L8E 3H2  
Telephone: (416) 561-7410

FILE NO. <u>E 309 - 07</u>	
LETTER NO. <u>R 346 - 33</u>	
DEPT. OF ENGINEERING	
AUG 16 1979	
ROUTE	REC'D
ENV. SER.	READ BY
ENG. SER.	
TRANS. SER.	ANS. BY
REG. SURV.	FILED BY
Q.M.	







Ontario

Ministry  
of the  
Environment

APPENDIX #5

1175, Sherbourne Ave.  
Toronto, Ontario M5C 1H7  
(416) 636-2215

July 3, 1979

REGISTERED MAIL

FILE NO.	
LETTER NO. <b>R343-33</b>	
DEPT. OF ENGINEERING	
AUG 2 1979	
NOTE	REC'D
IV. SER.	READ BY
ENG. SER.	
TRANS. SER.	ANS. BY
REG. SURV.	FILED BY

Re: Request for Proposal -  
Limited-Term Solidification  
Facilities for Liquid Industrial  
Wastes in Ontario

The attached "Request for Proposal" details the needs for limited-term facilities to treat and dispose of liquid industrial wastes in Ontario and indicates that the best limited-term solution to the problem at this time is the establishment of one or two "silicate-based" chemical fixation or solidification plants.

Your company has been invited to submit a proposal because the Ministry is aware that either your company markets a potential waste solidification process or that your company is established in the waste treatment and disposal field and may have access to a solidification process. A list of other companies invited to submit proposals is attached for your information. The Ministry also intends to advertise through appropriate media.

Also attached for your information is a waste classification guideline. The 20-25 million gallons referred to in the Request for Proposal is made up primarily of categories in the 100 series and categories 201, 301, 303, 402 and 190. Wastes which can be incinerated should not be considered for solidification.

.... / 2



If your company is interested in submitting a proposal, more detailed information on the types and quantities of wastes can be made available upon request.

As stated in the Request for Proposal, any proposal to establish facilities will be subjected to an environmental hearing under the terms of The Environmental Assessment Act, 1975. A copy of this Act is attached also for your information. The Ministry is prepared to assist the successful proponent(s) through the hearing process and staff will be available to help in the preparation of the submission to the Hearing Board.

Would you please acknowledge receipt of this request at your earliest convenience and indicate whether your company is interested in submitting a proposal.

Yours truly,

L. F. Pitura, Director  
Waste Management Branch

/nlc

Attachments

cc E. W. Turner



## MINISTRY OF THE ENVIRONMENT

### REQUEST FOR PROPOSAL TO ESTABLISH FACILITIES FOR THE CHEMICAL FIXATION OR SOLIDIFICATION OF LIQUID INDUSTRIAL WASTES IN ONTARIO

#### 1. BACKGROUND INFORMATION

In October, 1978, the Minister of the Environment, the Honourable Harry Parrott, DDS, announced his intention to ban the direct landfilling of untreated liquid industrial wastes in Ontario after January 1, 1980.

Following the announcement, Ministry staff have talked to companies in the waste management business about the prospects for developing alternative waste treatment and disposal facilities in the Province but, to date, no proposals have been received which could provide alternative outlets in a reasonable timeframe.

On January 1, 1980, generators of waste will be faced with the prospect of having no place in Ontario to dispose of a large quantity of wastes currently going to landfills. With this in mind, the Ministry reviewed a number of alternative waste treatment and disposal technologies and concluded that silicate-based, chemical fixation or solidification offers the best prospects for developing limited-term, (non-permanent), disposal facilities. Chemical fixation or solidification, it was reasoned, would be able to handle the bulk of the 20-25 million gallons per year of wastes which are not incinerated and which are currently landfilled or exported to the United States. Meanwhile, the Ministry is proceeding with its long-term plan to develop permanent treatment and disposal facilities in the Province. Solidification will be considered also in the long-term plan.

#### 2. DETAILS OF PROPOSAL

##### a) Concept

The concept being proposed is the establishment of one or two, limited-term, solidification plants which would handle a wide variety of wastes, convert these into a "solid" material



which could be stockpiled under controlled conditions until such time as permanent treatment and disposal facilities are available.

Surface run-off and leachate from the stockpile could be collected and re-treated. Also, the plants would provide a solidified product which could be used to assess the process. Final disposition of the stockpiled material would be largely dependant on the data collected from such an assessment program.

The Ministry estimates that one or more plants would be required for a limited-term, up to five years. This time-frame is based on an estimate of the time required to develop permanent facilities consistent with the Ministry's long-term plan. A solidification plant may be converted into a permanent facility, providing its acceptability is proven and providing it can be made to fit into the overall Provincial scheme for waste handling.

b) Sites

- (i) Ownership: The Ministry is seeking proposals for the development of facilities on privately-owned sites.
- (ii) Number of Plants: To minimize the impact of transportation costs on the waste generators, the Ministry believes that at least two plants may be required.
- (iii) Plant Locations: Plants should be located bearing in mind that the following general areas represent major concentrations of waste producing industries:
  - Toronto-Hamilton area;
  - Sarnia-Windsor area.
- (iv) Siting: Due to the limited term of these solidification facilities and the potential environmental concerns, sites which may not meet long-term disposal requirements can be considered.

Should a site be proposed as a permanent site with on-site, permanent disposal of the solidified product, the Ministry may wish to enter into an agreement with the site owners whereby the Crown acquires the disposal site and its liabilities.





Zoning: Local zoning requirements will have to be considered. The Ministry is prepared to assist where problems are encountered.

c) Government Involvement

- (i) Costs Associated with Environmental Hearings: An environmental hearing, pursuant to the requirements of The Environmental Assessment Act, will be required for each site proposed:

The government is prepared to underwrite the costs of a hearing in the event that approval is not granted up to a maximum amount of \$100,000 for each site.

Where approval is granted, the proponent will be expected to recover the cost of the hearing as part of the fee structure.

- (ii) Costs Associated with Removal of Solidified Material: The cost of moving accumulated solidified material to a permanent disposal site at the end of the term, if necessary, should not be allowed for in this proposal since the government will undertake this responsibility.

- (iii) Viability of Plant(s): On January 1, 1980, landfilling of untreated liquid industrial wastes will be prohibited by regulation and strictly enforced. The impact of the regulation forms the guarantee that generators and haulers of liquid industrial wastes will have to use the facility. Flow of wastes to approved private facilities may also occur over time and be competitive with the solidification plant.

The proponent should take the factor of regulatory impact into account in the development of a financial forecast for a plant operating for a limited period of five years. Consideration should be given to the influence of other facilities including a second solidification plant as well.



Within this context, the proposal should elaborate on any additional requirements necessary to ensure a viable enterprise. These requirements will be taken into account on assessing the proposals.

- (iv) Bonds: The government will expect the successful proponent(s) to offer a performance bond on its process to ensure that the process will, in fact, meet all its claims. The amount of the bond expected would be in the order of 50 percent of the capital cost of the project, excluding land costs.

d) Financial Considerations

- (i) Detailed Cost Estimate: As part of the proposal, the proponent should submit a detailed breakdown of estimated costs. This breakdown should include:
- cost of land;
  - capital cost of plant;
  - capital cost of site development;
  - engineering and consultants fees;
  - environmental hearing costs.
- (ii) Fees: To enable the Ministry to assess alternative proposals, the proponent should submit as part of any proposal, a schedule of fees. This schedule should include projected fees for various levels of operation, eg., 5, 10, 15 or 20 million gallons per year.

e) Solidification or Chemical Fixation Process

- (i) General: The proposal should include details of the proposed process, including any patent descriptions, assessment reports, laboratory data, etc., pertinent to the application of the process to mixed liquid industrial wastes.
- (ii) Other Applications: The proposal should document application of the process in other fields or countries which may be pertinent to an assessment of the process.



(iii) Quality Control: The proposal should provide details of a corporate approach to quality control, with respect to the receipt, storage and processing of wastes. Proposed controls on the disposition of the processed materials should also be furnished.

(iv) Leachate Collection and Monitoring: The proposal should provide sufficient detail to describe how the surface run-off and leachate from the stockpiled material will be collected and treated. Also, any special monitoring requirements necessary to ensure "safe" storage should be discussed.

(v) References/Contacts: The proponent should furnish names and addresses of references and contacts which the Ministry could use in assessing the proponent and the process.

f) Experience/Staffing

The proponent should submit documentation of the company's experience in the waste treatment field, together with details of the background and experience of corporate staff members who would be assigned responsibilities for this project.

g) Timetable

The proponent should provide a timetable for the project which will include the following:

- (i) preparation for environmental hearing including site assessment, engineering and preparation of assessment statement;
- (ii) following approval, site preparation and plant construction time schedules.

h) Contract/Agreement

The proponent should provide details of any special terms and conditions which will be required from a corporate standpoint before a contract or agreement can be finalized.





3. GENERAL

The Ministry is attempting to solicit the assistance of the waste disposal industry by forwarding this request for proposals to a number of companies known to own or have rights to solidification processes. A list of those receiving this request is attached for your information.

a) Proposal Deadline

A proposal, developed on the basis of the above requirements, should be forwarded to the Ministry no later than August 15, 1979, addressed to:

Mr. L. F. Pitera, Director  
Ontario Ministry of the Environment  
Waste Management Branch  
135 St. Clair Avenue West  
Toronto, Ontario  
M4V 1P5

b) Enquiries on Proposal

Any enquiries on this request for proposals should be made directly to:

1. Mr. E. W. Turner  
Tel: (416) 636-3284 or 636-5329
2. Mr. L. F. Pitera  
Tel: (416) 636-3284 or 636-8015

If necessary, staff will be willing to meet with proponents at their convenience prior to the submission of a proposal.

c) Interviews

Following the receipt of proposals, as an aid to assessing the various companies before a decision is made, the Ministry may wish to interview those companies which submit proposals.



LIST OF COMPANIES RECEIVING "REQUEST FOR PROPOSAL"

1. SCA Services, Inc.
2. Canadian Waste Management
3. Browning-Ferris Industries *... for*
4. Woodington Systems, Inc.
5. Stabatrol Corporation
6. Canadian Waste Technology, Inc.
7. STABLEX Corporation -
8. Frontenac Chemical Waste Service
9. IU Conversion Systems, Inc. *(Incl. Utilities)*
10. Tricil Limited
11. Cemstobel, S.A.



**FRONTENAC**  
Chemical Waste Service, Ltd.

1960 BRAMPTON STREET.

HAMILTON, ONTARIO, CANADA L8H 3S5

TELEPHONE (416) 545-4406

August 17, 1979

The Regional Municipality of Hamilton Wentworth  
Engineering Department  
71 Main Street West  
Hamilton, Ontario

Attention: Mr. Jim Leach

Re: Temporary Improvements to  
Solidification Plant -  
Upper Ottawa Street Landfill.  
Temporary Improvements to  
Pier 24 Transfer Station.

FILE NO.	
LETTER NO. <i>R347-36</i>	
DEPT. OF ENGINEERING	
AUG 22 1979	
ROUTE	REC'D
ENV. SER.	READ BY
ENG. SER.	
TRANS. SER.	ANS. BY
REG. SERV.	FILED BY
G.M.	

Dear Mr. Leach:

In accordance with our continuing discussion of the last two weeks, we wish to advise you of the following:

1. Temporary improvements to the Upper Ottawa Street Solidification Plant will consist of:
  - (A) Temporary building approximately 40' x 50' to house dry reagents.
  - (B) Additional land space of approximately 1-1/3 acres for curing area.
  - (C) Replacement of mixing device to allow for heavier end product and housing of same in small temporary building.
  - (D) Installation of lime silo.
  - (E) Drawings to be submitted on Tuesday, August 21, 1979.
2. Temporary improvements to Pier 24 Transfer Station.
  - (A) Installation of two (2) 10,000 gallon cone bottom reactors.
  - (B) Installation of one (1) 5,000 gallon and one (1) 10,000 gallon storage tanks.

cont'd....2



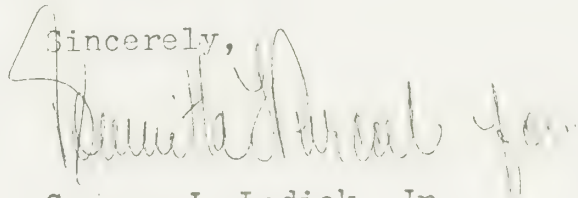
The Regional Municipality of Hamilton Wentworth (cont'd.)

2. Temporary improvements to Pier 24 Transfer Station. (cont'd.)
- (C) General site improvements in diking, etc.
- (D) Drawings to be submitted on Tuesday, August 21, 1979.
3. Schematic of proposed new plant will be submitted on Tuesday, August 21, 1979.
4. Test result of Solidification Process done by Recra Research Inc., a U.S. company confirm that solidified end product suitable for daily cover in landfill. (see Ministry Proposal).
5. We are enclosing a copy of our proposal to the Ministry relative to a Comprehensive Waste Management Program for Ontario for your inspection and comment.

We believe we have proposed a sound Waste Management Program for Ontario Wastes. Implementation of our program requires the approval and support of the Region. We feel that our program will be of significant value to further Industrial Development in the Hamilton Region as well as, continuing to supply useable fill to the Upper Ottawa Street Landfill. We are prepared to co-operate fully and to whatever extent the Region feels necessary to carry forward our program in a controlled credible manner.

Thank you very much for your consideration and assistance in this matter.

Sincerely,

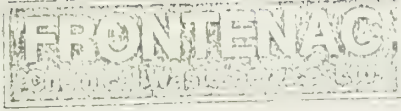


George J. Lodick, Jr.  
President

GJL/wd  
Encl.







1960 BRAMPTON STREET, HAMILTON, ONTARIO, CANADA L8H 3S5

TELEPHONE (416) 545-4406

August 15, 1979

The Regional Municipality of Hamilton Wentworth  
Engineering Department  
71 Main Street West  
Hamilton, Ontario

Attention: Mr. J.H. Bishop

Dear Sir:

Re: Solidification Reagents

Our solidification of regional wastes requires four types of additives. We import these reagents from suppliers outside of the Hamilton Wentworth region.

Reagents categorized as follows:

1. High strength acids with large quantities of ferrous iron to blend with the chromic acids from Stelco and Dofasco.
2. High strength acids to blend with zinc hydroxide from Proctor and Gamble.
2. Clays to supply the silicate.
4. Limes - to act as the acid neutralizer, and are supplied by:

Lime

Stelco Hamilton - waste lime dust.  
Stelco Ingersoll - quick lime.  
Domtar Woodstock - hydrate lime.

cont'd....2

FILE NO. ....	
LETTER NO. <u>X 341-62</u>	
AUG 15 1979	
ROUTE	REC'D
ENV. SER.	READ BY
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REG. SURV.	FILED BY
QM	



The Regional Municipality of Hamilton Wentworth (cont'd.)

Clay

Canada Brick Region of Halton - clay granular.  
Rolland Paper Toronto - clay waste product.

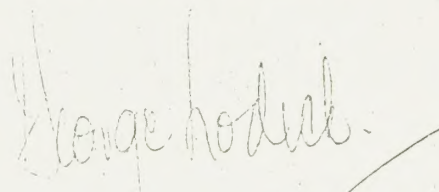
High Strength Acid With Ferrous Iron

Pure Metals Malton	-	sulphuric acid & ferrous iron
Hogarth Malton	-	" " " "
General Steel Wares Fergus	-	" " " "

I have attached an excerpt from our July production report for your information.

Trusting this is sufficient to clarify the question on reagents.

Yours very truly,



George Lodick, Jr.  
President

GL/wd  
Encl.





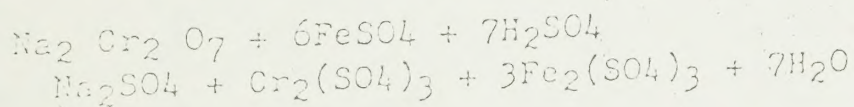
Imported reagents (Solid):- Jul 1979

The use of clays and lime is an absolute necessity to the solidification process. Unfortunately, these reagents are not available in either type or quantity, in the Hamilton-Wentworth region. We therefore, imported the following:

<u>Type</u>	<u>Quantity</u>	<u>Source</u>
Clay	33,000 gals.	Rolland Paper
Clay	270 tons	Canada Brick
Lime	21 tons	Stelco (Hamilton)
Lime	25 tons	Stelco (Ingersoll)

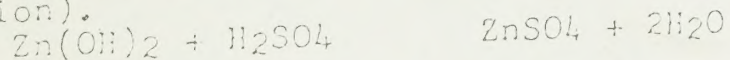
Imported Reagents (Liquid):-

During the month of July, the liquors generated in the Hamilton-Wentworth region contained some 3,510 lbs. chromium in the hexavalent state. Hexavalent chromium in addition to being highly toxic is not directly treatable via the solidification process. The pre-treatment of hexavalent chromium consists of reacting it with ferrous iron and sulphuric acid. (See the following equation)



The equation indicates in 'Ball Park' figures that for every pound of hexavalent chromium more than 3 lbs. of ferrous iron and something less than 7 lbs. of sulfuric acid are required for its pretreatment.

During July, we treated some 10,000 gallons of zinc hydroxide slurry which contained some 14 tons of zinc hydroxide which required dissolution in sulphuric acid before entering the solidification process. (See the following reaction).



This reaction indicates each pound of zinc hydroxide requires 1 pound of sulphuric acid for its dissolution.

In order to prevent what could have been a serious shortage of ferrous iron and sulphuric acid, we imported 8 loads of galvanizers highly acidic waste pickle liquor. Sources and amounts are as follows:

<u>Source</u>	<u># of Loads</u>
Hogarth Galvanizing Ltd.	10
Pure Metal Tinning	8

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